

Rochester Institute of Technology
Department of Computer Science

Evaluating the Usability and Security of a Video CAPTCHA

Master's Thesis Defense

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Abstract

A CAPTCHA is a variation of the Turing test, in which a challenge is used to distinguish humans from computers ('bots') on the internet. They are commonly used to prevent the abuse of online services. CAPTCHAs discriminate using hard artificial intelligence problems: the most common type requires a user to transcribe distorted characters displayed within a noisy image. Unfortunately, many users find them frustrating and break rates as high as 60% have been reported (for Microsoft's Hotmail).

We present a new CAPTCHA in which users provide three words ('tags') that describe a video. A challenge is passed if a user's tag belongs to a set of automatically generated ground-truth tags. In an experiment, we were able to increase human pass rates for our video CAPTCHAs from 69.7% to 90.2% (184 participants over 20 videos). Under the same conditions, the pass rate for an attack submitting the three most frequent tags (estimated over 86,368 videos) remained nearly constant (5% over the 20 videos, roughly 12.9% over a separate sample of 5146 videos). Challenge videos were taken from YouTube.com. For each video, 90 tags were added from related videos to the ground-truth set; security was maintained by pruning all tags with a frequency $\geq 0.6\%$. Tag stemming and approximate matching were also used to increase human pass rates. Only 20.1% of participants preferred text-based CAPTCHAs, while 58.2% preferred our video-based alternative.

Finally, we demonstrate how our technique for extending the ground truth tags allows for different usability/security trade-offs, and discuss how it can be applied to other types of CAPTCHAs.

Thesis Committee

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